

STRAWBERRY ANTHRACNOSE AND CROWN ROT CAUSED BY COLLETOTRICHUM FRAGARIAE

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Strawberry anthracnose caused by the fungus Colletotrichum fragariae Brooks was first described in 1931 from Florida (2). The fungus was initially thought to attack only the stolons of strawberry (Fragaria X ananassa Duchesne), but later it was shown to infect the petioles, fruits, and crowns (3, 5, 6, 8, 10, 14). The rot phase is of great concern to Florida growers since infected plants obtained from nurseries and set in fruit-producing field result in wilting and death of plants.

This disease was reported in 1960 from Louisiana (9) and in 1974 from Argentina (19). Other strawberry growing areas known to have this problem in the nurseries include North Carolina and Tennessee.

SYMPTOMS. The fungus commonly infects stolons and petioles causing dark brown, oval, sunken 1-2 mm lesions which increase in size longitudinally for several centimeters and may result in girdling of petioles and/or stolons (2, 6). The tips of the stolons are very susceptible and are easily invaded by fungus (2). An examination of stolon or petiole lesions with a 6-10X hand lens will usually show tufts black bristles and spore masses of the fungus (2).

Crown rot, which is of great concern on plants set in the fruit-producing field, is initially detected as wilting of the young leaves and a reddish brown dry rot of the pith and cortex (fig. 1). Infection of own may result from an infected stolon or leaf petiole (3, 5, 6, 8, 10).

Fruit infection is evidenced by dark brown, circular, sunken, firm rot lesions occurring anywhere on fruit (14). Sporulation is abundant on infected fruits.



Fig. 1. Strawberry crown rot caused by Colletotrichum fragariae. Longitudinal cuts of crowns of healthy plant (left) and infected plants (right).

DISEASE DEVELOPMENT. Inoculation tests (14) showed that within 2 days lesions developed (1.5 cm or long stolons of inoculated plants. Petiole lesions were detected within 35 days, and symptoms of wilt were evident within 57 days. In one experiment, when plants were inoculated in the summer, they died within 57 days. Symptoms of fruit infection were detected after 5 days.

Environmental factors favoring rapid development of the disease are temperatures above 24C (75F), high atmospheric humidity, and high soil moisture (6). When the mean daily temperature is below 24C (75F), wilt does not develop in the fields (4). Progress of the crown rot is slowed by low temperatures and remains inactive at 5C (11). Adventitious roots formed above the rotted crown may enable infected plants to survive for a limited time (5). The fungus is unable to survive in the soil for as long as 3 months (11). However, in Louisiana, the fungus does overwinter in surviving plants with infected crowns. The optimum temperature for growth and sporulation by C. fragariae is 30C with very little growth at 10 and 35C (10). Races of the pathogen have been isolated and identified in Louisiana (12).

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Other related fungi such as *Colletotrichum dematium* (Pers. ex. Fr.) Grove, *C. acutatum* Simmonds, and *Gloeosporium* sp. can cause infection of fruit and/or stolons of strawberry (1, 18, 20). However, *C. fragariae* is isolated consistently from infected plants in Florida.

HOST RANGE. Only two plants (*Cassia obtusifolia* L. and *Duchesnea indica* (Andr.) Focke) in addition to *Fragaria X ananassa* are susceptible to *C. fragariae* (2, 15). Plants shown to be nonhosts include cowpea; (*Vigna unguiculata* (L.) Walp.), velvet bean (*Mucuna deeringiana* (Bort) Merrill), *Crotalaria spectabilis* Roth, alfalfa (*Medicago sativa* L.), hollyhock (*Althaea* sp.), red clover (*Trifolium pratense* L.), snapdragon (*Antirrhinum majus* L.), spinach (*Spinacia oleracea* L.), stringbean (*Phaseolus vulgaris* L.), *Agrimonia* sp., blackberry (*Rubus* sp.), dewberry (*Rubus* sp.), *Gerardia* sp., and *Ludwigia virgata* Michx. (2, 3).

CONTROL. Procedures used in the nursery to control infection of stolons and petioles can control the wilt or crown rot phase of the disease (4). Plants infected in the nursery and subsequently transplanted to the fruit-producing field will ultimately develop crown rot. Healthy plants from the nursery will seldom contract the disease in the fruit-producing field.

In the nursery, fungicides have been an effective control of anthracnose in some cases (3, 7, 12, 13, 17). Benomyl 50W at 1 lb/200 gal (0.45 kg/757 l) per acre (0.4 ha) on a 7-day schedule in an early report gave the best control of all fungicides tested (13). However, field observations since then have indicated that to obtain adequate control of anthracnose on highly susceptible varieties, soil fertility must be kept very low in the nursery from June through August, and fungicides such as Captan at 4 to 8 lbs (1.8 to 3.6 kg), Benlate at 1 lb (0.45 kg) or Thylate at 3 to 4 lbs (1.4 to 1.8 kg) per acre (0.4 ha) must be applied at least twice per week from mid-June through September (17). The grower should be cautioned that the employment of these practices do not always give adequate control of the disease on the highly susceptible varieties under Florida conditions.

In Louisiana, sanitary procedures have reduced the incidence of crown rot (12). Plants sampled 20 ft (6.1 m) from a center of infection proved to be disease-free. The closer to the center of infection, the higher the incidence of crown rot in plants.

A high degree of resistance has been detected in some strawberry cultivars such as 'Florida Belle' and 'Dover' (16, 17). Plant varieties such as 'Tufts' and 'Tioga' are highly susceptible to *C. fragariae* (17).

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